

WHAT IS CLAIMED IS:

1. A surface acoustic wave device comprising:  
a piezoelectric substrate; and  
5 an electrode section, disposed on the piezoelectric substrate, having a thin-film structure,  
wherein the electrode section includes interdigital electrodes and junction electrodes connected to the interdigital electrodes, and the interdigital electrodes each  
10 include corresponding first base layers containing Ta and Cu layers or Cu-M alloy layers each disposed on the corresponding first base layers, where M represents one or more elements selected from the group consisting of Ag, Sn, and C.
- 15 2. The surface acoustic wave device according to Claim 1, wherein the Cu layers or Cu-M alloy layers have a crystal structure in which crystals are oriented in the (111) direction.
- 20 3. The surface acoustic wave device according to Claim 2, wherein the Cu layers or Cu-M alloy layers have an average grain size ranging from 10 to 100 nm.
- 25 4. The surface acoustic wave device according to Claim 1, wherein the Cu layers or Cu-M alloy layers contain crystal grains having a face-centered cubic structure and the element M is precipitated at grain boundaries.

5. The surface acoustic wave device according to Claim 1, wherein the element M is Ag and the Ag content of the Cu-M alloy layers ranges from 0.5 to 10% by mass.

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6. The surface acoustic wave device according to Claim 5, wherein the element M is Ag and the Ag content of the Cu-M alloy layers ranges from 0.8 to 10% by mass.

10 7. The surface acoustic wave device according to Claim 1, further comprising second base layers each disposed under the corresponding first base layers, wherein the second base layers contain titanium and/or titanium oxides.

15 8. The surface acoustic wave device according to Claim 7, wherein the second base layers have a configuration in which the titanium oxides are disposed on a region containing only titanium and the oxygen content of the titanium oxides gradually increases from the lower faces of the second base  
20 layers toward the upper faces.

9. The surface acoustic wave device according to Claim 1, wherein the first base layers have a thickness ranging from 5 to 15 nm.

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10. The surface acoustic wave device according to Claim 7, wherein the second base layers have a thickness ranging from 3 to 15 nm.

11. The surface acoustic wave device according to Claim 1, wherein the Cu layers or Cu-M alloy layers have a thickness ranging from 30 to 150 nm.

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12. The surface acoustic wave device according to Claim 1, further comprising protective layers, each disposed on the corresponding Cu layers or Cu-M alloy layers, containing Cr.

10 13. A process for manufacturing a surface acoustic wave device comprising the steps of:

forming a multi-layer film including a first base precursor layer containing Ta and a Cu precursor layer or a multi-layer film including the first base precursor layer and a Cu-M alloy precursor layer on a piezoelectric substrate,

15 the first base precursor layer and Cu precursor layer or the first base precursor layer and Cu-M alloy precursor layer being continuously formed;

etching the multi-layer film to form interdigital electrodes;

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forming junction electrodes each connected to the corresponding interdigital electrodes; and

heat-treating the piezoelectric substrate having the interdigital electrodes and junction electrodes thereon,

25 wherein M represents one or more elements selected from the group consisting of Ag, Sn, and C.

14. The process according to Claim 13, wherein any one

of the steps includes a sub-step of forming a protective precursor layer containing Cr on the Cu precursor layer or Cu-M alloy precursor layer.

5        15. The process according to Claim 13, wherein the element M is Ag and the Ag content of the Cu-M alloy precursor layer ranges from 0.5 to 10% by mass.

10        16. The process according to Claim 15, wherein the element M is Ag and the Ag content of the Cu-M alloy precursor layer ranges from 0.8 to 10% by mass.

15        17. The process according to Claim 13, wherein the temperature of the heat-treating step ranges from 250 to 300°C.

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18. A process for manufacturing a surface acoustic wave device comprising the steps of:

20        forming a second base precursor layer containing Ti on a piezoelectric substrate and then exposing the second base precursor layer to the atmosphere;

25        continuously forming a first base precursor layer containing Ta and a Cu precursor layer on the second base precursor layer or continuously forming the first base precursor layer and a Cu-M alloy precursor layer on the second base precursor layer;

etching the second base precursor layer, first base precursor layer, and Cu precursor layer or etching the second

base precursor layer, first base precursor layer, and Cu-M alloy precursor layer to form interdigital electrodes;

forming junction electrodes each connected to the corresponding interdigital electrodes; and

- 5        heat-treating the piezoelectric substrate having the interdigital electrodes and junction electrodes thereon, wherein M represents one or more elements selected from the group consisting of Ag, Sn, and C.

- 10        19. The process according to Claim 18, wherein any one of the steps includes a sub-step of forming a protective precursor layer containing Cr on the Cu precursor layer or Cu-M alloy precursor layer.

- 15        20. The process according to Claim 18, wherein the element M is Ag and the Ag content of the Cu-M alloy precursor layer ranges from 0.5 to 10% by mass.

- 20        21. The process according to Claim 20, wherein the element M is Ag and the Ag content of the Cu-M alloy precursor layer ranges from 0.8 to 10% by mass.

- 25        22. The process according to Claim 18, wherein the temperature of the heat-treating step ranges from 250 to 300° C.